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ABSTRACT

The paper describes two experiments conducted to improve writing skills of learning disabled adolescents. Experiment 1 used creative prompts plus a cut and paste editing strategy. In experiment 2, the same creative prompts were used with the Bank Street word processing program. Writing samples were scored for composition quality (holistic, number of complex sentences, and number of words per sentence), composition quantity (number of words) and transposition quality (percent of spelling errors) by group and time. Both experimental and control Ss improved from pretest to posttest in both experiments irrespective of editing strategy. Differential responses to the cut and paste versus computer strategies were described as were relative ease of program administration. Interpretations of the results suggest some caution about seeing computer technology as a "cure" for the writing difficulties of the learning disabled. (CL)

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Creative Writing Competency: A Comparison Of Paper and Pencil and Computer Technologies to Improve the Writing Skills of Mildly Handicapped Adolescents

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The need to improve deficits in language skills has long been a major concern of educators who work with special needs students. Many have isolated these skills into the decoding categories of listening and reading and the encoding skills of speaking and writing. In most curricula, oral based skills are seen as necessary prerequisites for print based skills (Myklebust, 1965) and decoding skills are seen as necessary prerequisites for encoding skills. This resulted in a remedial focus on listening, speaking and reading at the elementary school level with little time left for remedial writing (Kerchner and Kistinger, 1984). More recent work in the language area has questioned this approach (Graves, 1979; Heald-Taylor, 1984) and shown that through writing, all four language skills can be integrated and mutually enhanced.

At the secondary school level, the special needs students' inability to communicate effectively through print is often seen as his or her most serious deficit. This problem effects both the composition and transcription apsects of writing (Smith, 1982; Weber, 1982; Giordino, 1984; Bachor and Crealock, in press). Bereiter and Scardamalia (1982, 1984) have distinguished between novice and skilled writers in terms of knowledge telling and knowledge transformation models. The knowledge telling model is the one that is most frequently taught in the traditional school system and the one that special needs students have to master before they can use print in the more goal-directed and problem-solving manner of the skilled writer. To write effectively in the knowledge telling model, students rely on content knowledge and discourse knowledge in order to determine both the topics and subtopics and the type and order of sentence production. They need methods of probing and retrieving memory for relevant information and methods of testing whether the information gathered is appropriate. This model focuses on the composition aspect of writing.

For many special needs students, there are also many serious problems with the transposition aspect of writing. These students often spell poorly, their handwriting is hard to read, capitalization and punctuation are incorrect, sentences may be in fragments or run-on; all of which result in a final product that is most unimpressive. The word processing capabilities of computer technology have been seen as a method through which students might greatly improve the production component of their writing. Lindsay and Marini (1983) found that LD students ranging in age from 13 to 19 were able to increase the length and quality of their compositions over a school year through the application of word processing instruction. Previous efforts of these students had produced work that revealed numerous cross-outs, smudges, inserts, etc. that reinforced a poor image of themselves as writers while the computer printed copy reinforced a much more positive image.

Other research reports that students who use the computer for writing are able to spend more time doing creative writing because they are spending less time in the mechanical aspects of recopying old drafts (Sitko, in press).

Additional support for the utility of computer technology in improving writing skills is provided in a longitudinal project developed for mildly handicapped students in the Cupertino School District of California (Preston, 1984). In this project, the investigators combined creative teacher prompts and classroom brainstorming with computer word processing technology to yield written compositions that improved in overall literacy quality and in technical appropriateness. Moreover, the investigators reported <u>significant</u> gains for elementary age students in both holistic writing scores and written expression cluster scores on the Woodcock-Johnson Psychoeducational Battery.

Another recent project (Kerchner & Kistinger, 1984) also found support for using word processors to significantly improve the writing skills of elementary age LD students. Kerchner & Kistinger (1984) combined the process or conference approach to writing with the word processing capabilities of the microcomputer to improve the writing skills of 4th-, 5th-, and 6th- grade LD students. Compared with a control group who used no word processing, the experimental LD computer group who used the "Bank Street Writer" (Broderbund Software, 1982) to compose, edit and refine their work, made larger writing gains over a 7 month period of instruction. Significant gains favoring the computer experimental groups, were revealed on several subtests of the "Test of Written Language," (TOWL) (Hammill & Larsen, 1978). The investigators concluded that their results suggest that improved written language skills on the computer transfer to pencil-and-paper tasks. Moreover they argue for a holistic language arts program which utilizes the word processor with LD students and treats reading and language development, as well as written expression, simultaneously in one integrated program.

One final area of concern in the writing area has been student attitudes towards writing in general and towards specific aspects of writing such as instructional practice and essential components. Giordino (1984) has developed open-ended questionnaires that tap into both cognitive and affective attitudes that he feels are important additions to an understanding of the LD students' perception of themselves as writers.

The two studies reported here were conducted to address three broad objectives:

1. To improve students' written composition skills.
2. To improve students' written production skills.
3. To better understand students' attitudes towards themselves as writers.

Method

A. Experiment Number One

Subjects: Five students identified as SLD and enrolled in the resource room program and 32 students from two classes of grade 10 English (general level) participated in the project. The SLD students were all of average to high average intellectual ability, had a mean age of 15 years, 8 months and had serious problems in written language. The grade 10 students were of average ability, had a mean age of 15 years, 3 months and were performing at approximately grade level in written language. The five SLD students and 16 grade ten students participated in the experimental group while the second grade 10 group comprised the control group.

Instruments: 1. A writing attitude questionnaire was developed that asked students questions about how they handled problems that occurred while they were writing, how they would help others with problems and how teachers would help others. It also probed for descriptions of 'good writers' and for ways in which they would like to be better writers.

2. Pre and post test samples of written prose that were scored holistically for overall quality and specifically for technical appropriateness.

Procedure: A. Pretesting. All students were administered the writing questionnaire in their classroom. Students who could not complete it on their own were given individual help. Students were also asked to write a story on a topic of their choice for twenty minutes.

B. Experimental. The five SLD students then participated in ten writing sessions. During the first session they developed a writing grid. This involved brainstorming with the students for seven components of a story, e.g. hero, climax, beginning sentence, villain, etc., and for ten examples of each component; e.g., hero - cops, Hercules, Superman, Casper and Ghost, Mr. T. etc. This resulted in the 7 x 10 grid. Students were then instructed to generate seven one-digit numbers, write them down in vertical order and then find the corresponding components from the grid. An example would be:

Random Number	Story Component	Specific Element
4	Topic	horror
3	Hero	Superman
0	Villain	Medusa
1	Heroine	Wonderwoman
5	Denouement (ending)	Then she died.
6	Climax	She shot him.
7	Title	Cheech and Chong

They then discussed with a peer how they would integrate the seven elements into a story. Students next were given strips of paper and instructed to write a sentence on each piece. When they were finished to their satisfaction, the experimenter would go over the story and make suggestions for content editing. The sentence strips would be arranged with spaces where the student needed to add more detail to make the story flow. After the student edited for content, the experimenter would go over the story and make suggestions for technical improvement. Once the student made the suggested corrections, he would copy out the final product. The students created two grids and two stories each.

One of the grade 10 classes participated in a similar ten session experience. Because of the larger number of students involved (16), the experimenter would bring home the students' stories at various stages and write out her suggestions for content and technical improvements. When the student and experimenter felt the product was acceptable, the student then copied it out in final form.

The second grade 10 group participated in the pre and post testing sessions and had writing instruction during the ten sessions according to the regular curriculum.

All three groups were administered the questionnaire and asked to write a story for twenty minutes during their English class period.

B. Experiment Number Two

Subjects: Four grade 9 English classes at a local vocational school participated in the experiment. Two classes comprised the computer plus grid group, one class the grid group, and one class the control group. The ages of these students ranged from 14 years, 0 months to 16 years, 4 months with a mean age of 14 years, 9 months. Their IQ scores on the WISC-R ranged from 58 to 104 with a mean of 85. Their estimated reading scores ranged from grade 3 to 7 with a mean of grade 5.0. There was no difference between the four classes on age or IQ but the mean estimated reading score for the grid and control groups was grade 5.8. While for the experimental group, was grade 4.3.

Procedure: A. Pretesting: All students in each class were administered the Piers-Harris Children's Self Concept Scale, and asked to write two stories during two class periods. The prompt for the

first story was 'A Day in my Life at Ross' (a structured prompt) while the directions for the second story were 'to write about anything they wanted to'. Students were given twenty minutes to write each story. Following this, each student was interviewed individually with a writing questionnaire devised to measure current attitudes toward writing and computers.

B. Pre-Experimental: 1. In three of the four classes, a writing grid similar to that described in experiment 1 was developed.

Students randomly chose their elements and then were divided up into pairs to discuss how they could use them all effectively in a story. They were given fifteen minutes for discussion and encouraged to jot down ideas on the page that contained the elements.

The group who experienced only the grid, were then asked to write up a story based on their elements. This was done in their English class over the fall term.

The two groups who were to be involved in the computer aspect of the project were then given two typing sessions using the Bank Street Typing Tutor program and a session to familiarize them with the Bank Street Writer and/or Story Writer.

C. Experimental: During this phase, students in the computer plus grid groups came down to the computer room and worked with Commodore 64 or Commodore PET microcomputers. The sessions ran for approximately one hour, half of which were devoted to typing tutor and half to writing up the story suggested by the grid. Students had four to six sessions each depending upon

attendance. There were ten computers available to the project which usually accommodated all students present in class for English on each day during the experimental period. A research assistant set the students up at the computer, helped them with technical aspects and gave them input on content and technical editing.

D. Post Test: The two computer groups were asked to write a story for twenty minutes on any topic they chose using the computer. All four groups were administered a paper and pencil post test in their English classes with instructions to write for twenty minutes on any topic they chose. They were then interviewed individually with the writing questionnaire and the eight items from the Piers-Harris that reflect student perception of ability and cognitive skills.

The duration of the project was twelve weeks with students involved two or three times per week depending on the scheduling of their English classes.

RESULTS

Complete data from nineteen students in the computer plus grid group, eleven students in the grid group, and eight students in the control group were available for analysis.

The test data in both experiments were coded by a research assistant. Stories were scored for holistic goodness and on several technical aspects (number and type of sentences, number of words per sentence, spelling, punctuation, appropriate vocabulary, reader vs. writer based). The Piers-Harris Self Concept Scale was scored for overall score, ability and cognitive aspects.

The writing questionnaire was scored for student approach to writing difficulty, for opinion about good writing and for attitudes towards computers. Frequencies, means and standard deviations were calculated for all variables by groups. Two-way multiple analyses of variance with repeated measures were calculated on attitude and writing scores.

Final printouts of stories written during the experimental phase were scored for holistic quality, number of sentences and number of words per sentence. These were compared to stories written in the pre and post test components of the project by a one way multiple analysis of variance with repeated measures.

There were several differences noted between experimental students in experiments 1 and 2 in response to the paper and pencil versus computer methodologies. The first has to do with the writing aspect per se. The computer group wrote only one story during the experimental period and spent most of their time writing the original story while the paper and pencil group wrote two stories and divided their time equally between composition and editing. In the paper and pencil group, all students worked on writing at the same time in their English class while the computer group worked in shifts in the library resource center. The paper and pencil group required little instructional training apart from reminders to write one sentence per strip while the computer group used approximately ten half hour sessions to develop minimal word processing and keyboarding skills. Other differences resulted from the students themselves. The paper and pencil groups were of average or better intellectual ability and though the SLD students' writing skills were as poor as many of the CLD computer group, their attendance and attitude towards the project were consistently appropriate. The computer group on the other hand were much more variable in their mood and spotty in attendance

which affected their writing efforts quite dramatically. When they were available physically and psychologically however, the computer group were very enthusiastic about using the computer.

Because there were high correlations and no significant differences between pre and post test scores on the writing questionnaire, only pre test scores are reported here.

Attitudes towards writing were analyzed for student perception of good writers and approach to task problems for self and others. Tables 1 and 2 illustrate the results for experiments one and two. There is considerable consistency between the two experiments in terms of the differences in how students view themselves and others. They are well aware that skilled writers are good because of their attention to their reader and style of writing but they feel they would be better writers if their technical skills were improved.

These self-other differences are seen again in their responses to task problems. Cognitive approaches such as-stop and think about the problem and spaced effort (leave it for awhile and then go back fresh) are the preferred approaches for themselves while using others (teachers or parents) is the preferred approach for others. This suggests that if left to their own devices, students feel able to use appropriate cognitive devices to get over writing problems but if they are in a position of helping others, they would refer them to competent adults as the aid of first choice. This dichotomy between self and others is especially interesting in view of the large body of literature reporting special needs' students dependence upon others in academic situations.

Writing samples were scored for composition quality (holistic, number of

complex sentences, and number of words per sentence), composition quantity (number of words) and transposition quality (per cent of spelling errors) by group and time. Table 3 shows the results. In experiment one, the grade 10 (control) group was omitted from this analysis due to discrepancies in how the writing samples were obtained at pre test. In neither experiment were there any differences between groups suggesting that variations in technology do not improve writing output. In experiment one, there were significant differences between pre and post scores for holistic score, per cent of spelling errors, and number of words. There was an interaction between group and time for spelling errors with the SLD group making slightly more errors in the post test and the grade 10 group making many fewer. These results are confirmed in experiment two with significant differences noted on holistic score and number of words. There are interactions between group and time on number of complex sentences and number of words.

For the computer group in experiment two, writing samples at the pre test, experimental, and post test phases were analyzed for holistic score, number of words, and sentence length. Figure 1 illustrates the results. Sentence length remains consistent during each stage but holistic score and number of words are much improved in samples obtained during the experimental phase.

Discussion

These studies were concerned with three issues: attitude toward writing, composition improvement, and production improvement.

There was considerable consistency among the three different groups of students (LD, general level grade 10, basic level GLD) who responded to

the writing questionnaires in experiments one and two. The most striking similarity is the dichotomy between self and other on the two main dimensions. While students are aware that composition issues (reader based, writing style) are important for good writers, their own needs focus on transposition issues which suggests support for any strategy that makes getting their ideas into print in an acceptable form worthwhile. It then follows that if the transposition aspect is made easier, more emphasis could be placed on composition issues and they would become good knowledge tellers in time. The second dimension, how to handle task problems, also revealed a strong self-other polarization. In this instance, students showed a strong sense of self reliance in terms of helping themselves and of other reliance in terms of how they could help others. One could conclude then that these results indicate that students are well aware that both composition and production aspects of writing are important and that thinking about problems plus continued effort are necessary for improving one's skills. This suggests a generally positive, informed attitude to writing that should auger well for involvement in the writing curricula.

Composition issues were addressed through use of the grid model to probe students' memory for relevant content and through use of a paper strip and word processing approach that would encourage students to edit their work for logical integrated flow of all seven grid elements. While students in the experimental groups did improve significantly in overall story quality during the experimental phase, the improvements transferred only minimally to free writing efforts in the post test phase. And while there were significant pre-post differences in writing, it may be that any writing practice for three months is the major determinant of improvement in written composition rather than special approaches. Production improvement

was addressed through the use of the Bank Street Writer program in the computer group (experiment two) and through the paper strip approach in the paper and pencil group (experiment one). In both experiments, as mentioned above, students wrote integrated stories of greater length and quality during the experimental phase. These gains were maintained at a significant but lower level in the post test phase. However gains were also made by the control group in experiment two. These data therefore do not suggest that computer methodology is any better than either traditional or paper strip methods in improving the writing production of students.

This finding is somewhat contradictory to those reported by Marini and Lindsay (1983) and Kerchner and Kistinger (1984). One of the major differences between their studies and ours is the length of time students spent in the experimental component of the study, that is, twelve and seven months versus three months. Given the difficulties involved in reaching word processing proficiency, it is not unreasonable that students who were in a similar program for less than half the time would not show similar gains. Another difference between the studies is the nature of the post test. Kerchner and Kistinger (1984) used the TOWL (Hammill and Larson, 1978) test to determine change rather than a free writing sample. In the test situation there may be more awareness of the importance of the effort and more structure to guide the students while in the free writing situation students may make poorer use of their time and ability. This seems especially relevant in experiment two where the post test occurred in the last class before Christmas with students who were not strongly motivated to write stories for relative strangers. One final difference between the studies lies in the nature of the students themselves. In both the Marini and Lindsay

and Kershner and Kistinger studies, the students were identified as LD which usually suggests average or better intelligence while in experiment two, the students were of below average intelligence and were more than one grade level lower than the control groups in reading ability. Each of these differences suggests that considerably more time would be needed to both teach the new skills and rehearse them sufficiently well to ensure that they would become internalized and applicable to other writing tasks. This conclusion suggests that educators of special needs students need to be ready to devote considerable time and energy to teaching word processing and key boarding skills if they are to expect significant gains in writing skills. Where there is not sufficient hardware, software, teacher competence, student motivation, and administrative support for long term efforts, it might be best to concentrate on giving students lots of opportunity to write with less complex paper and pencil supports such as poor spellers dictionairies, erasable pens, and conferencing time to help with organization of content. While these strategies do not have the appeal of the computer technologies, they may be as effective for many students at a much lower cost. This may be especially true for students whose major writing tasks as adults will be of a paper and pencil nature.

Table 1

Student Perception of Writing Characteristics of 'Good Writers' and Selves

A. Experiment One

Characteristic	Treatment Group: SLD(n=5) Self	SLD(n=5) Other	IOE(n=16) Self	IOE(n=16) Other	IOC(n=16) Self	IOC(n=16) Other	F Value	Probability
Reader Based	0%	0%	13%	44%	0%	50%	1.75	.1881
Style of Writing	0%	20%	6%	44%	19%	31%	1.89	.1984
Ability	0%	50%	13%	19%	0%	31%	3.09	.0581
Technical Skills	100%	20%	69%	6%	63%	6%	3.02	.0619

B. Experiment Two

Characteristic	Treatment Group: E(n=19) Self	E(n=19) Other	C_1(n=11) Self	C_1(n=11) Other	C_2(n=8) Self	C_2(n=8) Other	F Value	Probability
Reader Based	21%	21%	10%	10%	11%	33%	.87	.3581
Style of Writing	0%	0%	0%	0%	0%	11%	1.84	.1833
Ability	0%	26%	0%	30%	0%	33%	13.70	.0007
Technical Skills	63%	37%	100%	30%	89%	44%	18.77	.0001

Table 2

Student Perception of Approach to Task Problems
for themselves and others

A. Experiment One

Approach	Treatment Group						F Value	Probability
	SLD(n=5)		10E(n=16)		10C(n=16)			
	Self	Others	Self	Others	Self	Others		
Cognitive	80%	20%	50%	44%	81%	31%	13.88	.0007
Spaced Effort	0%	0%	19%	13%	31%	13%	12.71	.0011
Persistent Effort	40%	40%	50%	44%	44%	13%	2.26	.1415
Using Others	0%	20%	0%	38%	13%	50%	17.18	.0002
Using Materials	0%	20%	0%	0%	0%	0%	.40	.5310

B. Experiment Two

Approach	Treatment Group						F Value	Probability
	E(n=19)		C_1(n=11)		C_2(n=8)			
	Self	Others	Self	Others	Self	Others		
Cognitive	63%	26%	45%	27%	75%	25%	29.58	.0000
Spaced Effort	58%	0%	45%	0%	25%	13%	27.32	.0000
Persistent Effort	16%	5%	9%	13%	13%	13%	.09	.7723
Using Others	16%	84%	18%	36%	13%	88%	30.39	.0000
Using Materials	5%	11%	9%	9%	0%	0%	.46	.5032

Table 3

Scores on Writing Characteristics Before and After Treatment for Experimental and Control Groups

A. Experiment One

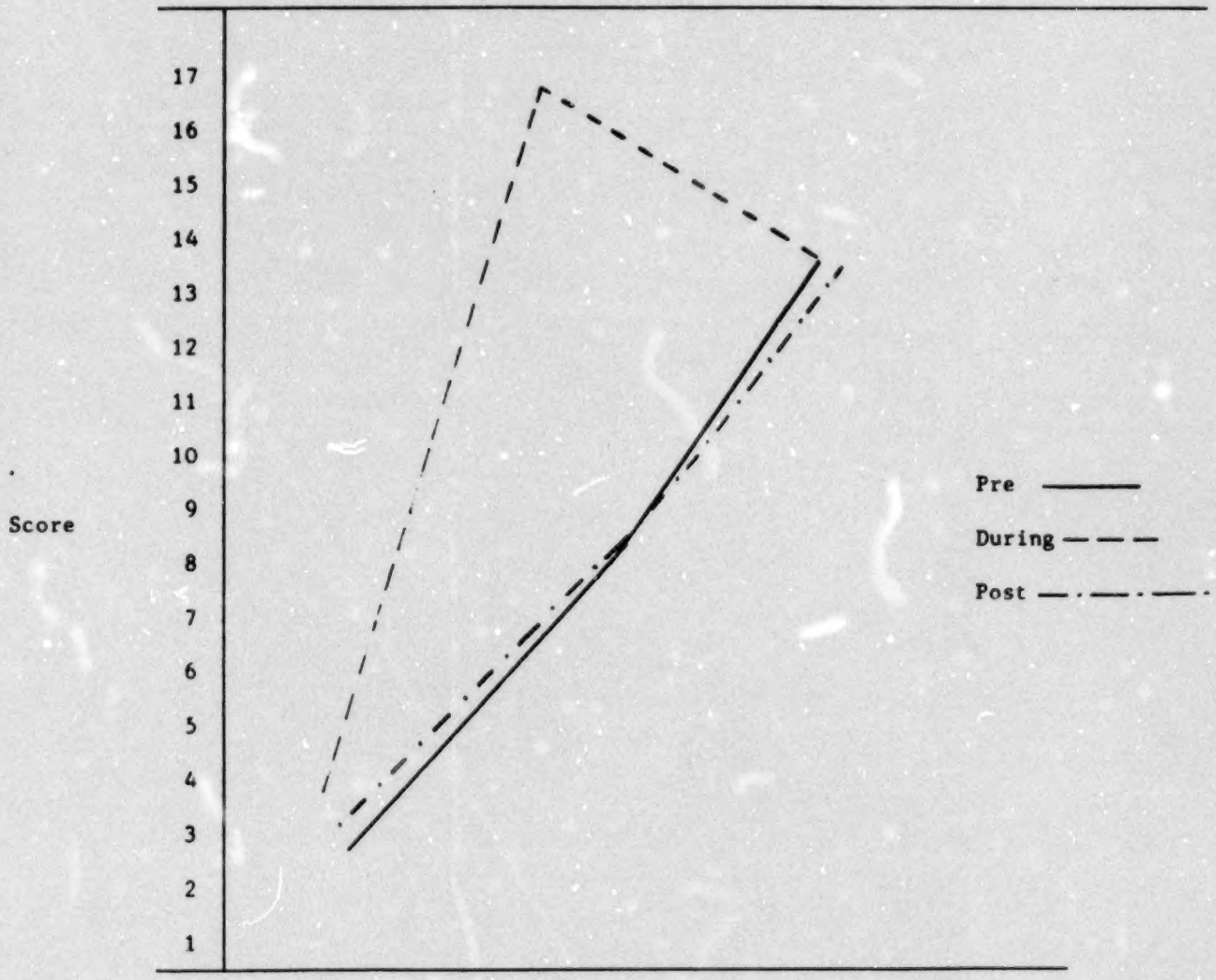
Writing Characteristic	Treatment Group				F Value	Probability
	SLD(n=5)		IOE(n=16)			
	Pre	Post	Pre	Post		
Wholistic Score	3.5	3.6	3.5	4.0	7.92	.0107
Number of complex sentences	6.3	6.2	3.6	5.2	.67	.4241
Per cent spelling errors	3.6%	4.3%	8.4%	1.2%	8.31	.0092
Number of words	146	153	122	187	6.32	.0206
Number words/sentence	12.7	12.8	12.1	13.2	.34	.5642

B. Experiment Two

Writing Characteristic	Treatment Group						F Value	Probabilit
	E(n=19)		C_1(n=11)		C_2(n=8)			
	Pre	Post	Pre	Post	Pre	Post		
Wholistic Score	2.9	3.2	3.0	3.3	2.9	3.3	7.32	.0105
Number of complex sentences	2.5	2.5	3.7	2.7	1.6	3.4	.46	.5043
Per cent spelling errors	16.5%	14.6%	15.6%	18.0%	15.8%	12.1%	.42	.5196
Number of words	83	83	67	97	63	137	10.11	.0031
Number words/sentence	13.4	13.1	15	15.3	11.7	13.8	.42	.5209

Figure 1

Writing Scores Before, During, and After Treatment



	Wholistic Score	Number of Words/10	Number of Words/sentence
Pre	2.9	83	13.4
During	4.1	165	13.5
Post	3.2	83	13.1
F Value	32.91	7.70	.04
Probability	.0000	.0017	.9645

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